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Data from over 1,200 correlations reported in 38 studies concerning validity of aptitude and achievement predictors of success in high school vocational programs are summarized. Predictors investigated were (1) verbal intelligence, (2) nonverbal intelligence and abstract reasoning, (3) arithmetic reasoning, (4) spatial aptitude, (5) mechanical comprehension, (6) perception, (7) manual dexterity, (8) specific purpose aptitude tests, (9) grade point average, and (10) achievement tests. Correlation coefficients were used as the index of relationship between the predictor and criteria. Findings revealed (1) substantial variation in results from study to study, (2) some rather sharp differences in the levels of correlation obtained for the various predictors within a given vocational area, (3) greater predictability of success in some vocational areas than in others, (4) success of girls in vocational areas more highly predictable than that of boys, and (5) low levels of predictive validity for dexterity tests. As a way to meet the need for more useful data, a center for the validation of aptitude tests was proposed and its major functions described. (DM)

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# Predictors of Success in High School Level Vocational Education Programs: A Review

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## Abstract

Over 1200 correlations reported in 38 studies appearing since 1953 are summarized for 10 predictor categories and 11 vocational program areas. For each predictor-program combination the distribution of correlations is given along with median r, total N, number of correlations located, and an index to the relevant studies. Main trends include (a) substantial variation in results from study to study; (b) differences in level of predictor-criterion r among vocational areas and between males and females; (c) evidence of differential predictability; and (d) poor performance of dexterity tests. Validity data were inadequately reported in many of the studies. As a way to meet the need for more useful data, a "Center for the Validation of Aptitude Tests" was proposed and its major functions described.

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# Predictors of Success in High School Level Vocational Education Programs: A Review[1]

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It has been over 10 years since Patterson (1956) reported his comprehensive review of research on the prediction of success in trade and vocational school courses. Since that time steadily increasing interest and funds have been focused on vocational education and as a result, vocational counseling has become one of the most important guidance services in many American schools. In view of the concomitant need for information relevant to vocational decision making, a new look at the effectiveness of test data in the prediction of success in vocational programs would appear to be warranted.

The purpose of this report is to summarize data on the validity of aptitudes and school achievement for the prediction of success in high school level vocational education programs. Data on students not in high school are reported when the level of training and age of students approximate that of the high school programs. However, no data from military training programs or programs at the technical education level are included. Studies appearing from 1954, the date of the most recent reference in Patterson's review, through the summer of 1967 are covered. The prediction of success in occupations and occupational training programs for adults was recently reviewed by Ghiselli (1966). Both his monumental report and that by Patterson cover research dating back to the early 1920's.

## Literature Surveyed

Although the age of information retrieval systems has not yet arrived, several starts have been made. Services of the following systems were used in the literature search: University Microfilms DATRIX System, Machine Search Center of the University of Wisconsin's Center for Studies in Vocational and Technical Education, and the reference service provided until recently by Harvard's Center for Research in Careers. In addition, the usual reference sources such as Research in Education, Psychological Abstracts, Education Index, and the Review of Educational Research were covered along with each issue of 15 journals in areas associated with vocational education, guidance, and measurement. The manuals of all major and most minor aptitude tests and test batteries appearing or revised since 1953 were also covered.

For several reasons two types of studies, Masters theses and local, informal reports of school prediction studies, were reluctantly excluded from the survey. Those studies that subsequently achieved journal publication were, of course, included.

The final major source of references consisted of a series of papers from the Center for Vocational and Technical Education (1966) published under the heading, "Review and Synthesis of Research." The series, which is described as a benchmark for current vocational education research and for the Educational Resources Information Center, covers the five major vocational education areas plus industrial arts. Each review and synthesis paper contains a section on student personnel services that subsumes prediction and selection studies. It is significant that only 16 studies out

of a total of about 1350 cited in the six research review papers appeared to have at least some relevance to the topic of the search. The literature, in general, yielded few pertinent references.

## Predictors

Although some studies on the relationship of interest and/or personality measures to vocational school success were located, (e.g., Barnette and McCall, 1964; Foote, 1960; French, 1956; 1962; Hutson and Vincent, 1957; Perrine, 1955; Racky, 1959; Samuelson, 1958; Smith, 1957), this report is limited to studies using cognitive or motor ability predictors. Solution of the problem of how to categorize the many and varied predictors that have been used was arbitrary. Ghiselli (1966), for purposes of his review, presented and illustrated a classification system covering aptitude tests. His system, in modified form, was used in this review.

Test categories are as follows: verbal intelligence and/or academic aptitude (V-INTEL); nonverbal intelligence and abstract reasoning (NV-INTEL); arithmetic reasoning and computation (ARITH); spatial aptitude including spatial visualization, spatial relations, etc., (SPACE); mechanical principles, comprehension, knowledge, reasoning, etc., (MECH); perceptual speed and accuracy (PERCEPT); and manual dexterity (DEXT). This latter area (as well as several others) actually covers a wide variety of different types of measure including mark making, and finger, hand, and arm dexterity. It is obvious that the categories presented above cannot be viewed as ability factors. Neither do they uniquely identify a specific type of test. However, they do conveniently serve to differentiate among commonly used predictors.

There were three additional predictor categories not employed by Ghiselli. The first, specific purpose aptitude tests (SPEC), covers those tests constructed to predict success in one vocational area, e.g., shorthand or typing. These tests very often include items from the above categories as well as unique items of their own. The SPEC category does not include "home-made" tests constructed for use in a specific research project. In general, this type of measure is excluded from the review unless evidence of programatic research was available. The final two predictor categories, past grades and achievement tests, cover a wide variety of measures. Past grades (GPA), for example, include grades for varying amounts of course work in English, arithmetic, industrial arts, all academic subjects, etc. Achievement test data (ACH) usually fell in the areas of reading, spelling, or English grammar. Separate categories were impractical due to lack of sufficient data.

## Program Categories and Criteria

Unfortunately, many reports failed to describe the nature of the courses or programs studied. Others used gross labels such as business education, home economics, and shop. In addition, it was seldom clear, except by implication, whether a program was a Smith-Hughes type program or whether it was of the "one course a semester" variety.

Another problem involved how to categorize data for courses that are offered at different levels or for different purposes within a given vocational area. A prime example of this would be typing where studies were reported on everything from beginning typing to typing III. The "solution," of course, was to group all typing data into one category.

The guiding principle in forming program categories was to preserve as much data as possible for the summary without destroying the meaningfulness of the groupings through gross heterogeneity. Each of the eleven program categories listed below is followed by other examples of course titles.

1. Auto mechanics--auto shop, mechanics, automobile, auto diesel
2. Carpentry--woodworking, woodshop
3. Drafting--mechanical drafting, mechanical drawing
4. Electricity--electrical, electronics, electrical construction
5. Machine shop--machine, machinist
6. Industrial arts--This is, of course, a very broad category. Whenever adequate descriptions were available, programs in this area were included in one of the categories above.
7. Business education--This is another very broad category and covers programs with labels such as commercial, office worker, and business.
8. Bookkeeping--accounting
9. Typing--see discussion above
10. Shorthand--stenography
11. Home economics--It was impossible to determine when work in this area was vocational in nature from the data reported.

To cries of "But you can't do that!" it can only be said that with the amount of data available and the way in which it was reported, no better classification system could be found. The reader does have access to the data sources through the index system provided in the summary tables. Also, it would appear that most of the program categories represented do differ significantly from each other.

Relevant studies in a number of other vocational areas were located although the amount of data available did not meet the minimal criteria established for this review. Some of these areas are office machines (Crawford, 1966; Prescott, 1955; Turse, 1955), cosmetology (Crawford, 1966; French, 1956; Whitten, 1961), printing (Crawford, 1966; Droege, 1965; French, 1962), agriculture (French, 1962), commercial art and food service (Whitten, 1961).

Within a given vocational area the criterion of success used whenever available was grade point average in the students' vocational courses. Inadequate as it may be, this was the most common criterion employed although sometimes specially constructed rating scales or work samples were used. When multiple criteria were available, results obtained with only one of the criteria are reported for a given sample.

## Summary Procedures

The correlation coefficient was used as the index of relationship between the predictors and criteria with the resultant loss of a few studies in which only multiple correlation data was reported (e.g., Bolton, 1963; Merenda, Hall, Clarke, and Pascale, 1962; Samuelson, 1956). In the vast majority of studies the Pearson product-moment coefficient was used. Exceptions usually involved some type of biserial coefficient. The minimal sample size required for a coefficient to be included in the summary was 20. With only a few exceptions correlations are not reported in the summary for a predictor-criterion combination unless at least five coefficients were available for a minimum total of 100 cases and two separate studies. The exceptions involve studies in which sample size was unusually large. When no studies using a given predictor were found, its listing is omitted from the summary tables.

All studies included are predictive in nature, although the time interval varies widely from study to study. When predictor-criterion correlations were available for the same sample over more than one time interval, the correlations obtained over the longest time interval are shown unless sample sizes were seriously curtailed.

## Results

Data found in the review are summarized in Tables 1 through 11. The study index number refers to the number in parentheses following pertinent references in the list at the end of this review. As a rough index of the average level of relationship found for the various predictors, the median correlation is reported when a minimum of five coefficients is available. The percentage of coefficients falling within each of four arbitrary correlation intervals (i.e., .00-.30, .31-.45, .46-.60, and .61-.75) is presented in order to show the range of coefficients obtained for a given predictor with a given criterion. The number of coefficients reported in the tables does not usually agree with the number of studies indexed since many studies reported more than one coefficient for a given predictor. The total number of cases per predictor represents the total of the sample sizes for which data was reported. If two or more predictors in a category were used with the same sample, the sample size was included only once in the total for that category.

Several points stand out upon inspection of the data in Tables 1 through 11.

1. As shown by the percentage distribution of correlation coefficients for each predictor, there is considerable variation in the level of correlation obtained for a given predictor within a given vocational area. This, of course, is to be expected. While the data in the summary should provide perspective on what is most likely to be found, one can not be sure how well a predictor will work in his own situation until he tries it out. The implications one sees in the report of a single study should also be tempered by the variation observed here. Ghiselli, (1966, pp. 28-31) gives an excellent summary of the reasons for variation in results from study to study.

2. There are some rather sharp differences in the level of correlation obtained for the various predictors within a given vocational area. This is most easily seen by comparing the median correlations obtained for the predictors. It is obvious that all predictors do not perform equally well within a given area.

3. The predictability of success appears to be much greater in some vocational areas than in others. This is most easily seen in Table 12 where the median correlations obtained for each predictor are presented for each area. The medians obtained in shorthand and business education (which includes shorthand along with other courses) represent the upper extreme while those obtained in auto mechanics, carpentry, and electricity represent the lower extreme. In fact, one might question whether success as measured by grades is predictable to any practical extent in these latter areas. Of course, one must keep in mind the variation in relationship found from study to study and the possibility that multiple regression techniques could result in appreciable gains in predictability in a given setting.

4. Although considerable variation exists within both the male and female areas, the level of relationship obtained in vocational areas typically taken by girls is substantially higher than that found in areas typically taken by boys. Thus, the frequent observation that academic grades of girls are more predictable than those of boys would appear to hold for vocational courses.

5. The effectiveness of a given predictor varies from area to area. For example, the median correlation for V-INTEL varies from .14 to .18 for carpentry and electricity to .44 for business education and bookkeeping. The spread for five other predictors was as large or larger. This, taken together with the variation in level of correlation obtained within a given vocational area would appear to reveal a surprising amount of differential predictability, especially in view of the rather heterogeneous predictor and criterion categories. If, on the basis of the sketchy data presented in this review, one were to choose the two predictors likely to be most effective within each vocational area, eight of the ten predictors would be involved.

It should be noted that a low predictor-criterion correlation does not necessarily mean that a minimal amount of the aptitude being measured is unnecessary in a given vocational program. For example, a correlation of .06 between ARITH and grades in carpentry does not preclude the importance of a given level of competence in arithmetic for success in carpentry. If almost all students enrolled in the carpentry area have reached this level of competence, ARITH might fail to be a good predictor. Unfortunately correlation coefficients give no indication as to what the minimal levels of competence might be. For this information, expectancy tables or regression equations are needed.

6. The IQ as represented by V-INTEL is not the final word as a predictor of success in vocational courses. In fact, it was one of the two best predictors in only three of the eleven areas. Using IQ as the sole objective predictor of vocational school success would appear to be very unfair to many students.

7. Two types of predictors, PERCEPT and DEXT, appear to contribute relatively little to the prediction of success in the areas surveyed. Neither ranked among the two best predictors in any of the areas. In fact, DEXT frequently ranked at or near the bottom. Taken singly, the utility of these two types of predictors would appear to be in question. However, there may be specially constructed tests within the wide domain of perceptual and motor ability measures that perform well with a specific criterion. For example, see data on validity of the Tapping Test (Flanagan 1963) in typing courses. (Results for this test were included in the SPEC category.)

## Discussion

How, then, do these general trends fit Patterson's findings? First, Patterson (1956) also noted considerable variation in level of correlation from study to study. This is a fact of life. Even in a utopian era of adequate criteria, perfectly reliable tests, and large samples that are neither homogeneous nor heterogeneous, variation will still be found. It appears that nothing short of standardizing curricula, teachers, and students will eliminate it!

In addition, Patterson found that certain types of tests consistently turned out to be good predictors of success in trade school courses. However, he questioned whether tests possessed differential validity for the various

trade areas, and cited evidence to the contrary. Final judgment was reserved, apparently because the problem had not been studied extensively in the reports Patterson surveyed. Now that additional data is available, the case for differential prediction is more favorable.

Finally, the studies reviewed by Patterson generally failed to yield evidence of the efficacy of motor ability tests. Ghiselli (1966) also found a discouragingly low level of validity for these measures. In view of the large amount of time and expense involved in the administration of most motor ability tests, it appears doubtful that blanket use is justified.

Ghiselli's review revealed other trends particularly relevant to the prediction of vocational school success. For example, training criteria for adults appear to be much more predictable than proficiency criteria. Average validity coefficients of .30 for the former and .19 for the latter, while not high, do represent a substantial difference in "explained" variance. A more disturbing finding was that, in general, the good and poor predictors of training criteria did not closely correspond to the good and poor predictors of job proficiency criteria. It appears that the kinds of aptitudes important to the success of adults in training programs may differ from those important to job success. The same may hold true for young adults. Hence, to speak of job success as the ultimate criterion to be predicted may miss the point if successful completion of a training program is a prerequisite to job entry.

## A Suggestion

Validity data are not available, at least in published form, for a wide variety of commonly offered vocational programs. Published data are

often ambiguous with little commonality in reporting techniques from study to study. The definitive study will never be done due to the nature of the area being investigated. However, it should be possible to reach useful conclusions on the basis of numerous, interrelated studies reporting data in a comparable, unambiguous fashion. Something more than a validity information exchange would appear to be needed although that would be a start. A book of expectancy tables covering various educational situations (Fredricksen, 1951) should be useful and, indeed, prototypes have been available for some time. (For example, see Hills, Masters, and Emory, 1961.) What is really needed, however, would appear to be something on the order of a "National Center for Validation of Aptitude Tests." Among the primary functions of such a center would be the following:

1. Serving as a central processing agency for raw data on predictors and criteria reported in standardized form by schools wishing to do local validity studies. The test validation services already available at the college level through the College Entrance Examination Board's Validity Data Service and the American College Testing Program's Research Service might serve as models.

2. Accumulating, summarizing, and periodically publishing the results of these studies in a form usable by any counselor concerned with the practical problems of prediction in educational-vocational counseling.

3. Helping schools develop their own "package" of computer-based validation procedures or developing generalized packages applicable to different equipment configurations. In this way, schools could gradually assume reponsibility for their own studies as more and more electronic data processing equipment becomes available. The data processing packages developed might actually be a part of the computer-measurement system for guidance envisioned by Cooley (1964).

4. Exploring and applying new approaches to the prediction problem. For example, the usefulness of discriminant analysis techniques might be determined and a variety of predictor and criterion measures explored.

The center could, of course, have other functions of more relevance to measurement theory. The emphasis here has been on functions most directly serving the counselor and his counselees.

In this age of computer technology, it no longer seems necessary or appropriate to tolerate the unavailability of adequate data on the usefulness of our predictive measures. We are finally reaching the time when counselors can be provided with test interpretation tools instead of promises.

## References[1]


Barnette, W. L., Jr., & McCall, J. N. Validation of the Minnesota Vocational Interest Inventory for vocational high school boys. J. appl. Psychol., 1964, 48, 378-382.

Bennett, G. K., Seashore, H. G., & Wesman, A. G. Differential Aptitude Tests: Fourth edition manual. New York: Psychol. Corp., 1966. (1)

Bolton, F. B. Value of a vocational aptitude test battery for predicting high school achievement. Personnel Guid. J., 1963, 42, 280-284.

California Test Bureau. Technical report on the Multiple Aptitude Tests, 1959 Edition. Monterey, California: Author, no date. (2)

Casey, J. P., & Heemstra, Joyce. Development of criteria for screening shorthand enrollees. Bus. Educ. Forum, 1965, 19(4), 15 & 25. (3)

Center for Vocational and Technical Education, Ohio State University. Review and synthesis of research (series). Columbus: Author, 1966.

Cheney, T. M., & Goodish, Naomi. Analysis between certain variables and achievement in beginning shorthand. J. bus. Educ., 1963, 38, 317-319. (4)

Cooley, W. W. A computer-measurement system for guidance. Harv. educ. Rev., 1964, 34, 559-572.

Crawford, Margaret L. Available tests and their use in research and vocational education. Paper read at Nat. Seminar on Res. in Vocational-Technical Educ., Colorado State Univer., March, 1966. (5)

Davis, R. A. Will half a Turse do just as well? Bus. Educ. World, 1966, 46(5), 11-12. (6)

Di Bona, Lucille J. Predicting success in shorthand. J. bus. Educ., 1960, 35, 213-214. (7)

Dopplet, J. E., Seashore, H. G., & Odgers, J. G. Validation of the Differential Aptitude Tests for auto mechanics and machine shop students. Personnel Guid. J., 1959, 37, 648-655. (8)

Drew, A. S. The relationship of general reading ability and other factors to school and job performance of machinist apprentices. Unpublished doctoral dissertation, Univer. of Wisconsin, 1962. (9)

Droege, R. C. Validity extension data on the General Aptitude Test Battery. Voc. Guid. Quart., 1965, 14, 56-58.

Droege, R. C. Personal communication on GATB validity data. Nov. 1, 1967. (10)

Flanagan, J. C. Manual for the Tapping Test. Pittsburgh: Psychometric Techniques Associates, 1963. (11)

Flanagan, J. C., Fivars, Grace., & Tuska, Shirley A. Predicting success in typing and keyboard operation. Personnel Guid. J., 1959, 37, 353-357. (12)

Foote, R. P. The prediction of success in automotive mechanics in a vocational-industrial curriculum on the secondary school level. Unpublished doctoral dissertation, New York Univer., 1960. (13)

Fredricksen, N. O. Making test scores more useful for prediction. Educ. psychol. Measmt, 1951, 11, 783-787.

French, J. W. Educational and occupational validation of a high school comparative prediction battery (pilot study). Research Bulletin 56-1. Princeton, N. J.: Educ. Testing Service, 1956. (14)

French, J. W. Comparative prediction of success and satisfaction in high school curricula. Research Bulletin 62-4. Princeton, N. J.: Educ. Testing Service, 1962. (15)

Ghiselli, E. E. The validity of occupational aptitude tests. New York: Wiley, 1966.

Heemstra, Joyce J. Shorthand prognosis: Can we be sure? Educ. Forum, 1966, 20(5), 21 & 26. (16)

Hills, J. R., Masters, Pauline B., & Emory, Linda B. Supplement: Counselor's Guide to Georgia Colleges. Atlanta: Regents of the Univer. System of Georgia, 1961.

Hutson, B. T., & Vincent, N. M. Motivation and prognosis in shorthand. J. Bus. Educ., 1957, 33, 29-31. (17)

Ingersoll, R. W., & Peters, H. J. Predictive indices of the GATB. Personnel Guid. J., 1966, 44, 931-937. (18)

Jacobs, J. N. Aptitude & achievement measures in predicting high school academic success. Personnel Guid. J., 1959, 37, 334-341. (19)

Kaczkowski, H. R., & Connery, T. F. PMA factors as predictors of high school workshop performance. Psychol. Newsletter, 1958, 9, 232-233. (20)

Kaltsounis, G. L. National Aptitude Survey Test scores as predictors of achievement in high school vocational education courses. Unpublished doctoral dissertation, Univer. of Michigan, 1965. (21)

Long, J. R. Academic forcasting in the technical-vocational high school subjects at West Seattle High School. Unpublished doctoral dissertation, Univer. of Washington, 1957. (22)

McGuire, Rose I. A comparative study of first-term shop ratings from a battery of tests for three different vocational high school courses. Unpublished doctoral dissertation, Fordham Univer., 1956. (23)

Maedke, W. O. The relative prognosis value of selected criteria in the prediction of stenographic success or failure in selected secondary schools in Illinois. Unpublished doctoral dissertation, Northwestern Univer., 1957. (24)

Merenda, P. F., Hall, C. E., Clarke, W. V., & Pascale, A. C. Relative predictive efficiency of the DAT and a short multifactor battery of tests. Psychol. Rep., 1962, 11, 71-81.

Mitchell, B. C. The relation of high school achievement to the abilities measured by the Holzinger-Crowder Uni-Factor Tests. Educ. psychol. Measmt, 1955, 15, 484-490. (25)

Patterson, C. H. Predicting success in trade and vocational courses: Review of the literature. Educ. psychol. Measmt, 1956, 16, 352-400.

Pauk, W. Comparison of the validities of selected test procedures to predict shorthand success. Educ. psychol. Measmt, 1963, 23, 831-835. (26)

Perrine, M. W. The selection of drafting trainees. J. appl. Psychol., 1955, 39, 57-61. (27)

Prescott, G. A. Prediction of achievement in commercial subjects. Educ. psychol. Measmt, 1955, 15, 491-492. (28)

Racky, D. J. Predictions of ninth grade woodshop performance from aptitude and interest measures. Educ. psychol. Measmt, 1959, 19, 629-636. (29)

Samuelson, C. O. The General Aptitude Test Battery in predicting success of vocational school students. J. educ. Res., 1956, 50, 175-182.

Samuelson, C. O. Interest scores in predicting success of trade school students. Personnel Guid. J., 1958, 36, 538-541.

Smith, J. G. A study of scholastic accomplishment in secondary school mechanical arts in relation to pupils' relative preference for this subject. Unpublished doctoral dissertation, Univer. of Pittsburgh, 1957.

Sorrell, Helen H. A study of typewriting and reading scores. Nat. bus. Educ. Quart., 1959, 28(1), 66-67. (Abstract) (30)

Strickland, Esther H. Criteria for predicting success in shorthand at East High School, Columbus, Ohio. Nat. bus. Educ. Quart., 1958, 27(1), 73-74. (Abstract) (31)

Stoughton, R. W. The differential predictive values of the Differential Aptitude Tests in the Connecticut technical schools. Unpublished doctoral dissertation, Univer. of Connecticut, 1955. (32)

Traxler, H. W. Determining the usefulness of the General Aptitude Test Battery in predicting student success in a technical vocational high school. Unpublished doctoral dissertation, Univer. of Denver, 1966. (33)

Turse, P. L. Turse Clerical Aptitude Test: Manual of Directions. New York: World Book. 1955. (34)

U. S. Dep. of Labor, Bureau of Employment Security. Guide to the use of the General Aptitude Test Battery, section III: Development. Washington: U. S. Government Printing Office, 1962. (35)

White, Hortense G. Typing performance as related to mental abilities and interests: A preliminary study. J. educ. Psychol., 1963, 56, 535-539. (36)

Whitten, B. C. An investigation of the validity of selected criteria for admission to a vocational high school. Unpublished doctoral dissertation, Pennsylvania State Univer., 1961. (37)

Wright, Ellen M. A summary of recent (1940-62) selected findings in shorthand prognosis with specific reference to the use of the Byers' First-Year Shorthand Aptitude Tests at the high school in Southington, Connecticut. Nat. bus. Educ. Quart., 1964, 33(1), 70-71. (Abstract) (38)

## Footnotes

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[2]Numbers in parentheses following many of the references indicate the index number used in Tables 1 through 11.

Table 1

Summary of Validity Data for Auto Mechanics

| Predictor[a] | Mdn. r | Tot. N | No. of r's | Percentage distribution of r's by level of r: .00-.30 | .31-.45 | .46-.60 | .61-.75 | Study index no.[b] |
|---|---|---|---|---|---|---|---|---|
| V-INTEL | .20 | 1703 | 14 | 93% | 0% | 7% | 0% | 5,8,13-15,21,23,25,32, 33,37 |
| NV-INTEL | .23 | 1547 | 12 | 67 | 33 | | | 5,8,13-15,21,23,25,32 |
| ARITH | .17 | 1563 | 15 | 80 | 20 | | | 5,8,13-15,23,25,32,33 |
| SPACE | .20 | 1594 | 14 | 79 | 21 | | | 5,8,13-15,21,23,25,32,33 |
| MECH | .23 | 1468 | 10 | 80 | 20 | | | 5,8,13-15,23,32 |
| PERCEPT | .04 | 766 | 7 | 100 | | | | 5,8,14,15,32,33 |
| DEXT | .09 | 416 | 9 | 88 | 11 | | | 14,15,33 |
| SPEC | | 31 | 3 | | | | | 21 |
| GPA | | 156 | 4 | | | | | 33,37 |
| ACH | .14 | 888 | 8 | 88 | 12 | | | 8,13,23,32,37 |

[a]Abbreviations defined in section on predictors.

[b]Refers to numbers in parentheses following references in reference list.

Table 2

Summary of Validity Data for Carpentry

| Predictor[a] | Mdn. r | Tot. N | No. of r's | Percentage distribution of r's by level of r .00-.30 | .31-.45 | .46-.60 | .61-.75 | Study index no.[b] |
|---|---|---|---|---|---|---|---|---|
| V-INTEL | .14 | 1394 | 10 | 100% | 0% | 0% | 0% | 14,15,20,21,23,29,32, 35,37 |
| NV-INTEL | .19 | 1264 | 7 | 71 | 14 | 14 | | 14,15,20,21,23,29,32 |
| ARITH | .06 | 1187 | 11 | 82 | 9 | 9 | | 14,15,20,23,29,32,35 |
| SPACE | .24 | 1337 | 10 | 60 | 30 | 10 | | 14,15,20,21,23,29,32,35 |
| MECH | .27 | 614 | 5 | 60 | 40 | | | 14,15,23,29,32 |
| PERCEPT | .19 | 280 | 5 | 100 | | | | 14,15,32,35 |
| DEXT | .18 | 195 | 7 | 71 | 29 | | | 14,15,35 |
| SPEC | | 365 | 3 | 67 | 33 | | | 21,29 |
| GPA | | 57 | 3 | | | | | 37 |
| ACH | .07 | 334 | 5 | 100 | | | | 23,32,37 |

[a]Abbreviations defined in section on predictors.

[b]Refers to numbers in parentheses following references in reference list.

Table 3

Summary of Validity Data for Drafting

| Predictor[a] | Mdn. r | Tot. N | No. of r's | Percentage distribution of r's by level of r .00-.30 | .31-.45 | .46-.60 | .61-.75 | Study index no.[b] |
|---|---|---|---|---|---|---|---|---|
| V-INTEL | .39 | 727 | 9 | 33% | 44% | 22% | | 1,18,21,25,27,32,35 |
| NV-INTEL | .31 | 593 | 6 | 50 | 33 | 17 | | 1,5,21,25,32 |
| ARITH | .29 | 425 | 7 | 57 | 43 | | | 1,18,25,27,32,35 |
| SPACE | .42 | 793 | 9 | 22 | 56 | 22 | | 1,5,18,21,25,27,32,35 |
| MECH | | 84 | 3 | | | | | 1,32 |
| PERCEPT | .25 | 259 | 7 | 57 | 43 | | | 1,18,32,35 |
| DEXT | .07 | 175 | 6 | 100 | | | | 18,35 |
| SPEC | | 302 | 2 | | | | | 21 |
| ACH | .24 | 84 | 6 | 67 | 33 | | | 1,32 |

[a] Abbreviations defined in section on predictors.

[b] Refers to numbers in parentheses following references in reference list.

Table 4

Summary of Validity Data for Electricity

| Predictor[a] | Mdn. r | Tot. N | No. of r's | Percentage distribution of r's by level of r .00-.30 | .31-.45 | .46-.60 | .61-.75 | Study index no.[b] |
|---|---|---|---|---|---|---|---|---|
| V-INTEL | .18 | 601 | 10 | 70% | 20% | | 10% | 14,15,21,23,25,32,33,37 |
| NV-INTEL | .21 | 504 | 6 | 67 | 17 | 17 | | 14,15,21,23,25,32 |
| ARITH | .20 | 537 | 9 | 67 | 11 | 11 | 11 | 14,15,23,25,32,33 |
| SPACE | .34 | 567 | 8 | 50 | 38 | 12 | | 14,15,21,23,25,32,33 |
| MECH | | 444 | 4 | 75 | | 25 | | 14,15,23,32 |
| PERCEPT | | 310 | 4 | 100 | | | | 14,15,32,33 |
| DEXT | .00 | 266 | 5 | 100 | | | | 14,15,33 |
| SPEC | | 30 | 2 | | | | | 21 |
| GPA | | 97 | 4 | | | | | 33,37 |
| ACH | .24 | 275 | 5 | 100 | | | | 23,32,37 |

[a]Abbreviations defined in section on predictors.

[b]Refers to numbers in parentheses following references in reference list.

Table 5

Summary of Validity Data for Machine Shop

| Predictor[a] | Mdn. r | Tot. N | No. of r's | Percentage distribution of r's by level of r: .00-.30 | .31-.45 | .46-.60 | .61-.75 | Study index no.[b] |
|---|---|---|---|---|---|---|---|---|
| V-INTEL | .25 | 829 | 8 | 50% | 25% | 25% | 0% | 5,8,9,21,25,32,35,37 |
| NV-INTEL | .23 | 798 | 6 | 67 | 33 | | | 5,8,21,25,32 |
| ARITH | .35 | 752 | 6 | 33 | 33 | 17 | 17 | 5,8,25,32,35 |
| SPACE | .30 | 391 | 5 | 60 | 40 | | | 8,21,25,32,35 |
| MECH | .44 | 707 | 6 | 33 | 17 | 50 | | 5,8,9,32 |
| PERCEPT | .22 | 714 | 6 | 100 | | | | 5,8,32,35 |
| DEXT | .14 | 487 | 6 | 100 | | | | 5,35 |
| SPEC | | 86 | 2 | | | | | 21 |
| GPA | | 27 | 3 | | | | | 37 |
| ACH | .20 | 319 | 8 | 62 | 25 | 12 | | 8,9,32,37 |

[a]Abbreviations defined in section on predictors.

[b]Refers to numbers in parentheses following references in reference list.

Table 6

Summary of Validity Data for Industrial Arts

| Predictor[a] | Mdn. r | Tot. N | No. of r's | Percentage distribution of r's by level of r .00-.30 | .31-.45 | .46-.60 | .61-.75 | Study index no.[b] |
|---|---|---|---|---|---|---|---|---|
| V-INTEL | .30 | 2726 | 28 | 50% | 46% | 4% | 0% | 1,2,18,19,21,22,25 |
| NV-INTEL | .33 | 1493 | 19 | 42 | 26 | 26 | 5 | 1,21,25 |
| ARITH | .29 | 1801 | 24 | 54 | 17 | 29 | | 1,2,18,19,25 |
| SPACE | .29 | 2186 | 22 | 59 | 23 | 18 | | 1,18,21,25 |
| MECH | .25 | 787 | 17 | 71 | 24 | 6 | | 1,19 |
| PERCEPT | .24 | 1515 | 22 | 77 | 18 | 4 | | 1,2,18 |
| DEXT | .10 | 663 | 6 | 100 | | | | 18 |
| SPEC | | 494 | 2 | | | | | 21 |
| GPA | | 431 | 3 | 33 | 67 | | | 22 |
| ACH | .26 | 614 | 38 | 63 | 29 | 8 | | 1,2,19,22 |

[a]Abbreviations defined in section on predictors.

[b]Refers to numbers in parentheses following references in reference list.

Table 7

Summary of Validity Data for Business Education

| Predictor[a] | Mdn. r | Tot. N | No. of r's | Percentage distribution of r's by level of r .00-.30 | .31-.45 | .46-.60 | .61-.75 | Study index no.[b] |
|---|---|---|---|---|---|---|---|---|
| V-INTEL | .44 | 6228 | 29 | 24% | 38% | 34% | 3% | 1,2,10,14,15,18,19, 22,25 |
| NV-INTEL | .28 | 638 | 11 | 54 | 9 | 36 | | 1,14,15,25 |
| ARITH | .48 | 5315 | 26 | 12 | 27 | 50 | 11 | 1,2,10,14,15,18,19,25 |
| SPACE | .23 | 5131 | 23 | 74 | 22 | 4 | | 1,2,10,14,15,18,25 |
| MECH | .11 | 629 | 11 | 73 | 27 | | | 1,14,15,19 |
| PERCEPT | .34 | 4932 | 31 | 42 | 39 | 16 | 3 | 1,2,10,14,15,18 |
| DEXT | .16 | 4360 | 31 | 97 | 3 | | | 10,14,15,18 |
| GPA | .44 | 913 | 6 | 17 | 50 | 33 | | 22 |
| ACH | .46 | 1391 | 22 | 27 | 23 | 46 | 4 | 1,19,22 |

[a] Abbreviations defined in section on predictors.

[b] Refers to numbers in parentheses following references in reference list.

Table 8

Summary of Validity Data for Bookkeeping

| Predictor[a] | Mdn. r | Tot. N | No. of r's | Percentage distribution of r's by level of r .00-.30 | .31-.45 | .46-.60 | .61-.75 | Study index no.[b] |
|---|---|---|---|---|---|---|---|---|
| V-INTEL | .44 | 567 | 9 | 22% | 33% | 33% | 11% | 1,2,18,21,25 |
| NV-INTEL | .11 | 253 | 5 | 100 | | | | 1,21,25 |
| ARITH | .29 | 433 | 7 | 57 | 29 | 14 | | 1,2,18,25 |
| SPACE | .15 | 518 | 7 | 71 | 29 | | | 1,2,18,21,25 |
| MECH | | 138 | 4 | | | | | 1,2 |
| PERCEPT | .32 | 413 | 7 | 43 | 57 | | | 1,2,18 |
| DEXT | | 221 | 3 | | | | | 18 |
| SPEC | | 90 | 2 | | | | | 21 |
| ACH | .39 | 148 | 7 | 29 | 29 | 29 | 14 | 1,2 |

[a]Abbreviations defined in section on predictors.

[b]Refers to numbers in parentheses following references in reference list.

Table 9

Summary of Validity Data for Shorthand

| Predictor[a] | Mdn. r | Tot. N | No. of r's | Percentage distribution of r's by level of r: .00-.30 | .31-.45 | .46-.60 | .61-.75 | index no.[b] |
|---|---|---|---|---|---|---|---|---|
| V-INTEL | .40 | 1678 | 24 | 17% | 50% | 25% | 8% | 1-5,7,17,24-26,28,30,31,33 |
| NV-INTEL | .30 | 221 | 6 | 50 | 33 | | 17 | 1,5,25 |
| ARITH | .38 | 328 | 10 | 20 | 50 | 20 | 10 | 1,2,5,25,33 |
| SPACE | .16 | 261 | 7 | 71 | 29 | | | 1,2,5,25 |
| MECH | | 145 | 4 | | | | | 1 |
| PERCEPT | .13 | 308 | 9 | 78 | 22 | | | 1,2,5,33 |
| DEXT | | 21 | 3 | | | | | 5 |
| SPEC | .51 | 1542 | 11 | | 27 | 46 | 27 | 6,7,16,17,24,26,31,34,38 |
| GPA | .56 | 904 | 11 | | 27 | 36 | 36 | 3,4,16,17,24,31,33 |
| ACH | .51 | 554 | 17 | 6 | 24 | 53 | 18 | 1-4,17,30,31 |

[a] Abbreviations defined in section on predictors.

[b] Refers to numbers in parentheses following references in reference list.

Table 10

Summary of Validity Data for Typing

| Predictor[a] | Mdn. r | Tot. N | No. of r's | Percentage distribution of r's by level of r .00-.30 | .31-.45 | .46-.60 | .61-.75 | Study index no.[b] |
|---|---|---|---|---|---|---|---|---|
| V-INTEL | .30 | 2724 | 41 | 56% | 29% | 15% | 0% | 1,2,5,11,18,21,25,36 |
| NV-INTEL | .34 | 1420 | 22 | 36 | 32 | 27 | 4 | 1,5,21,25,36 |
| ARITH | .36 | 1654 | 33 | 39 | 33 | 21 | 6 | 1,2,5,18,25,36 |
| SPACE | .23 | 2003 | 30 | 70 | 20 | 10 | | 1,2,5,18,21,25,36 |
| MECH | .26 | 829 | 17 | 59 | 29 | 12 | | 1 |
| PERCEPT | .33 | 1596 | 30 | 43 | 37 | 17 | 3 | 1,2,5,18,28 |
| DEXT | .20 | 369 | 10 | 80 | | 20 | | 5,18 |
| SPEC | .38 | 1689 | 21 | 24 | 48 | 19 | 10 | 11,12,21 |
| GPA | | 20 | 1 | | | | | 36 |
| ACH | .36 | 910 | 36 | 31 | 33 | 31 | 6 | 1,2,5 |

[a]Abbreviations defined in section on predictors.

[b]Refers to numbers in parentheses following references in reference list.

Table 11

Summary of Validity Data for Home Economics

| Predictor[a] | Mdn. r | Tot. N | No. of r's | Percentage distribution of r's by level of r .00-.30 | .31-.45 | .46-.60 | .61-.75 | Study index no.[b] |
|---|---|---|---|---|---|---|---|---|
| V-INTEL | .38 | 2332 | 22 | 18% | 46% | 36% | 0% | 1,2,16,19,22,25 |
| NV-INTEL | .46 | 715 | 14 | 7 | 43 | 50 | | 1,25 |
| ARITH | .44 | 2070 | 19 | 5 | 47 | 42 | 5 | 1,2,18,19,25 |
| SPACE | .36 | 2021 | 18 | 28 | 56 | 17 | | 1,2,18,25 |
| MECH | .29 | 627 | 12 | 58 | 33 | 8 | | 1,19 |
| PERCEPT | .31 | 1884 | 17 | 47 | 41 | 12 | | 1,2,18 |
| DEXT | .20 | 563 | 6 | 100 | | | | 18 |
| GPA | | 262 | 3 | | | | | 22 |
| ACH | .42 | 889 | 27 | 15 | 52 | 30 | 4 | 1,19,22 |

[a]Abbreviations defined in section on predictors.

[b]Refers to numbers in parentheses following references in reference list.

Table 12

Median Correlation for Each Predictor

Within Each Vocational Program

| Vocational program | Predictors | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | V INTEL | NV INTEL | ARITH | SPACE | MECH | PER-CEPT | DEXT | SPEC | GPA | ACH |
| Auto mechanics | .20 | *.23* | .17 | .20 | *.23* | .04 | .09 | | | .14 |
| Carpentry | .14 | .19 | .06 | *.24* | *.27* | .19 | .18 | | | .07 |
| Drafting | *.39* | .31 | .29 | *.42* | | .25 | .07 | | | .24 |
| Electricity | .18 | .21 | .20 | *.34* | | | .00 | | | *.24* |
| Machine shop | .25 | .23 | *.35* | .30 | *.44* | .22 | .14 | | | .20 |
| Industrial arts | *.30* | *.33* | .29 | .29 | .25 | .24 | .10 | | | .26 |
| Business Educ. | .44 | .28 | *.48* | .23 | .11 | .34 | .16 | | .44 | *.46* |
| Bookkeeping | *.44* | .11 | .29 | .15 | | .32 | | | | *.39* |
| Shorthand | .40 | .30 | .38 | .16 | | .13 | | *.51* | *.56* | *.51* |
| Typing | .30 | .34 | *.36* | .23 | .26 | .33 | .20 | *.38* | | *.36* |
| Home economics | .38 | *.46* | *.44* | .36 | .29 | .31 | .20 | | | .42 |

Note--Where blanks occur, medians were not calculated due to insufficient data. The two or three highest medians for a given area are in italics.